WHAT IS CLAIMED IS:

1. Heart valve leaflet removal apparatus comprising a pair of cooperating cutting elements adapted for cutting and removing leaflets from the aortic valve in a patient's heart, one of said cutting elements being rotatably coupled to the other of said pair of cutting elements; a holder coupled to one of said cutting elements and adapted to receive the cut leaflets; and said cutting elements and holder being configured for delivery to the aortic valve leaflets through an aortotomy formed in the patient's aorta.

2. The apparatus of claim 1 wherein said pair of cooperating cutting elements are radially collapsible.

3. The apparatus of claim 1 wherein said pair of cooperating cutting elements have a first radial dimension when in a first state and a second radial dimension when in a second state.

4. The apparatus of claim 3 further including a sheath surrounding at least a portion of said cutting elements and retaining said cutting elements in said first state.

5. The apparatus of claim 4 wherein said cutting elements have a memory shape, are deformed when in said first state, and assume their memory shape when in said second state.

6. The apparatus of claim 5 wherein said cutting elements comprise spiral shaped elements.

7. The apparatus of claim 1 wherein said holder has a conical configuration.

8. The apparatus of claim 1 wherein said cutting elements comprise an annular cutting element and an annular cutting surface.

9. The apparatus of claim 8 wherein said holder has a conical configuration.

10. The apparatus of claim 8 wherein said cutting elements are biased away from one another.

11. A heart valve repair system comprising:

heart valve leaflet removal apparatus comprising a pair of cooperating cutting elements adapted for cutting and removing leaflets from an aortic valve in a patient's heart, one of said cutting elements being rotatably coupled to the other of said pair of cutting elements, a holder coupled to one of said cutting elements and adapted to receive the cut leaflets, said cutting elements and holder being configured for delivery to the aortic valve leaflets through an aortotomy formed in the patient's aorta; and

heart valve prosthesis delivery apparatus for placing an aortic valve prosthesis in the patient's heart comprising an aortic valve prosthesis support having a proximal portion and a distal portion and a plurality of fasteners ejectably mounted therein, said distal portion being adapted to be releasably coupled to the aortic valve prosthesis, and said valve prosthesis support being configured for delivery to the heart through the aortotomy formed in the patient's aorta.

12. The system of claim 11 wherein the aortic valve prosthesis support is adapted to support a prosthetic stentless valve, the system further including a balloon adapted to be placed in the prosthetic stentless valve and urge a portion of the prosthetic valve against the inner wall of the aorta of the patient so that when adhesive is applied to an exterior portion of the prosthetic valve and the prosthetic valve urged against the inner wall of the aorta, said exterior portion can adhere to the inner wall of the aorta.

13. The system of claim 11 further including a prosthetic valve configured to be coupled to said aortic valve prosthesis support.

14. A replacement valve delivery system comprising:

heart valve prosthesis delivery apparatus for placing an aortic stentless valve prosthesis in a patient's heart comprising an aortic stentless valve prosthesis support having a proximal portion and a distal portion and a plurality of fasteners ejectably mounted therein, said distal portion being adapted to be releasably coupled the aortic valve prosthesis, and said valve prosthesis support being configured for delivery to the heart through an aortotomy formed in the patient's aorta; and

a balloon adapted to be placed in the valve prosthesis and urge at least a portion of the valve prosthesis against the inner wall of the aorta of the patient so that when adhesive is applied to an exterior portion of the valve prosthesis and the valve prosthesis urged against the inner wall of the aorta said exterior portion can adhere to the inner wall of the aorta

15. The system of claim 14 further including an aortic stentless valve prosthesis configured to be coupled to said heart valve prosthesis support.

16. A method of repairing an aortic valve comprising:

removing aortic leaflets from a patient's aortic valve;

providing aortic valve prosthesis on delivery apparatus where the valve prosthesis has an annular portion;

introducing the valve prosthesis through an aortotomy formed in the patient's aorta with the delivery apparatus; and

simultaneously ejecting a plurality of self-closing clips from the delivery apparatus through said annular portion and then into the patient's aortic root to secure the valve prosthesis to the aortic root of the patient.

17. The method of claim 16 wherein removing the valve leaflets includes introducing cutting apparatus through the aortotomy.

18. The method of claim 16 wherein the delivery apparatus includes a plurality of arms that carry said self-closing clips.

19. The method of claim 18 wherein the delivery apparatus arms have sharp distal ends.

20. The method of claim 19 wherein providing the valve prosthesis on the delivery apparatus comprises penetrating the arms through a portion of the valve prosthesis.